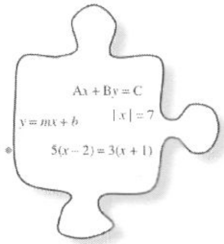
3.3.1 What if an equation has a product?

Solving Equations With Multiplication and Absolute Value



Now that you know how to multiply algebraic expressions, you can solve equations that involve multiplication. You will also solve equations that have an absolute value in them.

3-76. Review what you learned in Lesson 3.2.4 by multiplying each expression below. First decide if you will multiply each expression using the Distributive Property or using a generic rectangle. Remember to simplify your result.

a. $(6x-11)(2x+5)$

b. $-2x^2(15x^2-3t)$

c. $(6-y)(y+2)$

d. $16(3-m^2)$

3-77. Work with your team to solve each of these equations. Use the Distributive Property or draw generic rectangles to help you rewrite the products. Be sure to record your algebra work for each step.

a. $2(y-2)=-6$

b. $5x^2+43=(x-1)(5x+6)$

c. $(x+3)(x+4)=(x+1)(x+2)$

d. $2(x+1)+3=3(x-1)$

3-78. ABSOLUTE VALUE EQUATIONS

Find as many solutions to the following equations as you can.

a. $|x|=5$

b. $|x|=133$

c. $|x|=-2$

d. $|x-7|=10$

3-79. Solve $|3x-5|=16$. Work with your team to organize your work so that anyone could follow along to find both solutions.

3-80. Solve $|7-8x|=1$. Record your steps.

MATH NOTES

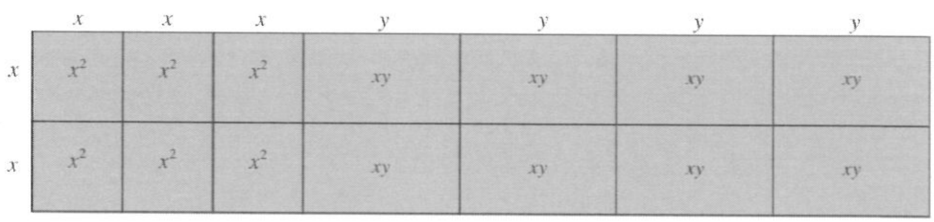
METHODS AND MEANINGS

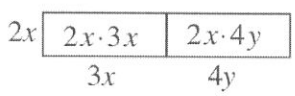
The Distributive Property

The **Distributive Property** states that for any three terms a, b, and c:

$$a(b+c) = ab + ac$$

That is, when a multiplies a group of terms, such as $(b + c)$, then it multiplies *each* term of the group. For example, when multiplying $2x(3x+4y)$, the $2x$ multiplies both the $3x$ and the $4y$. This can be shown with **algebra tiles** or in a **generic rectangle** (see below).





$2x(3x+4y)$
$2x(3x)+2x(4y)$, simplifying results in

The $2x$ multiplies each term.

Review & Preview

3-81. Find each of the following products by drawing and labeling a generic rectangle or by using the Distributive Property.

a. $-4y(5x+8y)$ b. $9x(-4+10y)$ c. $(x^2-2)(x^2+3x+5)$

3-82. Is the set of even numbers closed under addition? That is, if you add two even numbers, do you *always* get an even number? Is the set of odd numbers closed under addition? Explain your answers.

3-83. Find the dimensions of the generic rectangle at right. Then write an equivalency statement (length · width = area) of the area as a product and as a sum.

x^2	$-5x$
$3x$	-15

3-84. Solve for x. Use any method. Check your solutions by testing them in the original equation.

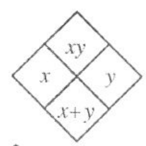
a. $|x-3|=5$

b. $5|x|=35$

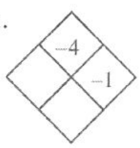
c. $|x+1|=2$

d. $|x+3|=-2$

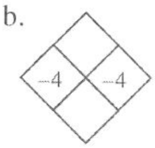
3-85. Copy and complete each of the Diamond Problems below. The pattern used in the Diamond Problems is shown at right.



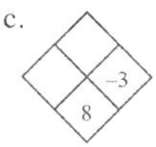
a.



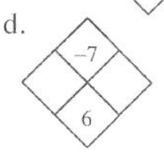
b.



c.



d.



3-86. If $f(x)=7+|x|$ and $g(x)=x^3-5$, then find:

a. $f(-5)$

b. $g(4)$

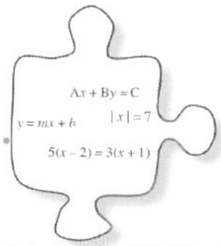
c. $f(0)$

d. $f(2)$

e. $g(-2)$

f. $g(0)$

3.3.2 How can I change it to $y = mx + b$ form?



Working With Multi-Variable Equations

So far in this course you have solved several types of equations with one variable. Today you will apply your equation-solving skills to rewrite equations with two or more variables.

3-87. You now have a lot of experience working with equations that compare two quantities. For example, while working on the Big Race, you found the relationship $y = 3x + 4$, which compared x (time in seconds) with y (distance in meters) for Elizabeth. For this pattern:

a. How much of a head start did Elizabeth get? How can you tell from the equation?

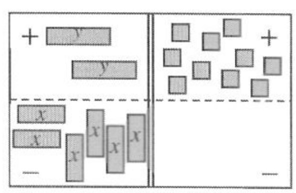
b. What was Elizabeth's rate of speed? That is, how fast did she go? Justify your answer.

3-88. CHANGING FORMS

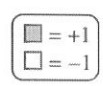
You could find the growth rate and starting value for $y = 3x + 4$ quickly because the equation is in $y = mx + b$ form. But what if the equation is in a different form? Explore this situation below.

a. The line $-6x + 2y = 10$ is written in **standard form**. Can you easily tell what the growth rate of the line is? Its starting value? Predict these values.

b. The equation $-6x + 2y = 10$ is shown on the Equation Mat at right. Set up this equation on your Equation Mat using tiles. Using only "legal" moves, rearrange the tiles to get y by itself on the left side of the mat. Record each of your moves algebraically.



c. Now use your result from part (b) to find the growth factor and starting value of the line $-6x + 2y = 10$. Did your result match your prediction in part (a)?



3-89. Many times in real-world situations a formula with more than one variable may not be in the form you need. The previous problem showed that standard form linear equations do not show the slope and y-intercept until they are solved for y, that is, until y is isolated on one side of the equation. The formulas in this problem are used in many different jobs. Sometime you need to solve them for a different variable in order for the formula to be useful. Solve each formula for the given variable.

a. $W = Fd$. Find the force, F, needed to move a piano given the amount of work applied, W, and distance moved, d.

b. $F = \frac{9C}{5} + 32$. Find the temperature in Celsius, C, when given the temperature in degrees Fahrenheit, F.

c. $\rho = \frac{m}{V}$. The symbol ρ is a letter of the Greek alphabet. Sometimes scientists use Greek letters for variables. Find the mass, m, of a precious stone given its density, ρ, and volume, V.

d. $I = \frac{W}{12.6r^2}$. Find, r, the distance to the light bulb, given I, the intensity of light, and W, the wattage of the light bulb.

3-90. Solve each of the following equations for the indicated variable. Use your Equation Mat if it is helpful. Write down each of your steps algebraically.

a. Solve for y: $2(y-3)=4$

b. Solve for x: $2x-6y=12$

c. Solve for y: $6x+y=2y+8$

d. Solve for x: $3(2x+4)=2+6x+10$

3-91. Solve each of the following equations for the indicated variable. Record your work.

a. Solve for x: $y=-2x+5$

b. Solve for p: $m=7-3(p-m)$

c. Solve for y: $x^2+4y=(x+6)(x-2)$

d. Solve for q: $4(q-8)=7q+5$

3-92. MORE CLOSED SETS

In Lesson 3.2.3 you were told that whole numbers are said to be a **closed set** under addition, but are not closed under subtraction. Then you discovered that integers and polynomials are a closed set under both addition and subtraction. With your team, explore closure under multiplication as follows:

a. Investigate with your team if the integers are a closed set under multiplication. Give examples of your conclusion. If you find that integers are closed under multiplication, can you explain how you know *all* integers are closed under multiplication?

b. Are one-variable polynomials closed under multiplication? In other words, if you multiply two polynomials that both have the same variable, will you always get a polynomial as your answer? Give examples and explain how you know your answer is true for *all* one-variable polynomials.

As a starting point, you may want to think about some of the products below.

i. $(x+2)(3x+4)$

ii. $9x(6-x^2)$

iii. $(3x^2+3)(3x^2+x+1)$

iv. $x(2x^2-12x+7)$

MATH NOTES

METHODS AND MEANINGS

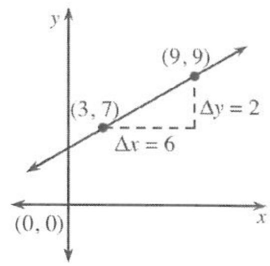
Linear Equations from Slope and/or Points

If you know the slope, m, and y-intercept, $(0, b)$, of a line, you can write the equation of the line as $y = mx + b$.

You can also find the equation of a line when you know the slope and one point on the line. To do so, rewrite $y = mx + b$ with the known slope and substitute the coordinates of the known point for x and y. Then solve for b and write the new equation.

For example, find the equation of the line with a slope of –4 that passes through the point $(5, 30)$. Rewrite $y = mx + b$ as $y = -4x + b$. Substituting $(5, 30)$ into the equation results in $30 = -4(5) + b$. Solve the equation to find $b = 50$. Since you now know the slope and y-intercept of the line, you can write the equation of the line as $y = -4x + 50$.

Similarly you can write the equation of the line when you know two points. First use the two points to find the slope. Then substitute the known slope and either of the known points into $y = mx + b$. Solve for b and write the new equation.



For example, find the equation of the line through $(3, 7)$ and $(9, 9)$. The slope is $\frac{\Delta y}{\Delta x} = \frac{2}{6} = \frac{1}{3}$. Substituting $m = \frac{1}{3}$ and $(x, y) = (3, 7)$ into $y = mx + b$ results in $7 = \frac{1}{3}(3) + b$. Then solve the equation to find $b = 6$. Since you now know the slope and y-intercept, you can write the equation of the line as $y = \frac{1}{3}x + 6$.

Review & Preview

3-93. Solve each equation. Be sure to find all possible answers and check your solutions.

a. $|x| = 7$

b. $|2x| = 32$

c. $|x + 7| = 10$

d. $|x| = 53.1$

3-94. Solve each equation below for the indicated variable.

a. $3x-2y=18$ for x

b. $3x-2y=18$ for y

c. $rt=d$ for r

d. $C=2\pi r$ for r

3-95. Evaluate the following expressions.

a. $-3\frac{2}{9}+8\frac{7}{9}$

b. $-7\frac{2}{7}-4\frac{1}{5}$

c. $1\frac{5}{7}\cdot 3\frac{6}{7}$

d. $-8\frac{1}{7}\div -5\frac{5}{9}$

3-96. Find the equation of each line described below.

a. A line with slope of 0 that passes through the point $(6,-11)$.

b. A line that passes through the points $(12, 12)$ and $(20, 6)$.

3-97. Graph the lines $y=-4x+3$ and $y=x-7$ on the same set of axes. Then find their point of intersection.

3-98. Simplify each expression using the laws of exponents.

a. $(x^2)(x^2y^3)$

b. $\frac{x^3y^4}{x^2y^3}$

c. $(2x^2)(-3x^4)$

d. $(2x)^3$

3-99. One way to solve absolute value equations is to think about "looking inside" the absolute value. The "inside" must be positive or negative, so you should solve the equation both ways. For example, you could record your steps as shown at right.

$$|5-2x|=19$$

$$\begin{array}{cc} 5-2x=19 & 5-2x=-19 \\ -2x=14 & -2x=-24 \\ x=-7 & x=12 \end{array}$$

Solve each equation. Be sure to find all possible answers and check your solutions.

a. $|9+3x|=39$

b. $|2x+1|=10$

c. $|-3x+9|=10$

d. $|3.2x-4|=-5.7$

3-100. Find each of the following products by drawing and labeling a generic rectangle or by using the Distributive Property.

a. $5x(x-6)$

b. $-9y(6-3y)$

3-101. For each generic rectangle below, find the dimensions (length and width). Then write the area as a product of the dimensions and as a sum.

a.

$2x^2$	$10x$

b.

$2x^2$	$10x$
$3x$	15

3-102. Solve each of the following equations. Be sure to show your work carefully and check your answers.

a. $2(3x-4)=22$

b. $6(2x-5)=-(x+4)$

c. $2-(y+2)=3y$

d. $3+4(x+1)=159$

3-103. Multiply each of the following expressions. Show all of your work.

a. $(x+3)(4x+5)$

b. $(-2x^2-4x)(3x+4)$

c. $(3y-8)(-x+y)$

d. $(y-4)(3x+5y-2)$

3-104. Solve each of the following equations for the indicated variable. Show all of your steps.

a. $y=2x-5$ for x

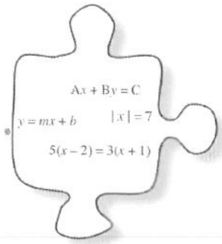
b. $p=-3w+9$ for w

c. $2m-6=4n+4$ for m

d. $3x-y=-2y$ for y

3.3.3 What kinds of equations can I solve now?

Summary of Solving Equations



You have been developing your equation-solving skills in this chapter. Today you will practice solving several types of equations. At the end of the lesson, you will summarize everything you know about solving equations.

3-105. Your teacher will explain the way you will work today on the problems below. As you work, be sure to record all of your steps carefully. Check your solutions, if possible.

a. Solve for c: $E = mc^2$

b. Solve for m: $a = \frac{F}{m}$

c. Solve for x: $-6 = -6(3x-8)$

d. Solve for y: $3x + 6y = 24$

e. Solve for x: $2 - 3(2x-1) = 17$

f. Solve for y: $|3-5y| = 3$

g. Solve for x: $y = -3x + 4$

h. Solve for x: $x(2x-1) = 2x^2 + 5x - 12$

i. Solve for w: $2(v-3) = 1 - (w+4)$

j. Solve for x: $4x(x+1) = (2x-3)(2x+5)$

3-106. LEARNING LOG

In your Learning Log, write a letter to Clarissa, a new student in class, explaining everything you have learned about how to solve equations. Clarissa does not have algebra tiles, so you will need to show her how to solve *without* the tiles. Make up examples that show all of the different equation-solving skills you have. Be sure to explain your ideas to her thoroughly so she will know what to do on her own. Title this entry "Summary of Solving Equations" and include today's date.

MATH NOTES

METHODS AND MEANINGS

Using Generic Rectangles to Multiply

A generic rectangle can be used to find products because it helps to organize the different areas that make up the total rectangle. For example, to multiply $(2x+5)(x+3)$, a generic rectangle can be set up and completed as shown below. Notice that each product in the generic rectangle represents the area of that part of the rectangle.

	$2x$	$+5$
x		
$+3$		

$\longrightarrow$

	$2x$	$+5$
x	$2x^2$	$5x$
$+3$	$6x$	15

$$\underbrace{(2x+5)(x+3)}_{\text{area as a product}} = \underbrace{2x^2+11x+15}_{\text{area as a sum}}$$

Note that while a generic rectangle helps organize the problem, its size and scale are not important. Some students find it helpful to write the dimensions on the rectangle twice, that is, on both pairs of opposite sides.

Review & Preview

3-107. Solve each equation.

a. $3(x-2)=-6$

b. $2(x+1)+3=3(x-1)$

c. $(x+2)(x+3)=(x+1)(x+5)$

d. $|x-5|=8$

3-108. Find the equation of the line based on the table.

x	3	−2	5	12
y	4	−11	10	31

3-109. Find an equation of the line with slope $\frac{1}{5}$ passing through the point $(10, 9)$.

3-110. This problem is a checkpoint for operations with rational numbers. It will be referred to as Checkpoint 3.

Compute each of the following problems with fractions.

a. $-\frac{2}{3}+\left(-\frac{1}{8}\right)$

b. $3\frac{1}{2}-\left(-1\frac{1}{3}\right)$

c. $\left(-4\frac{1}{5}\right)\left(-\frac{1}{3}\right)$

d. $\left(-\frac{2}{3}\right)\div\left(\frac{1}{4}\right)$

e. $1\frac{3}{4}+\left(-5\frac{1}{3}\right)$

f. $\left(-2\frac{2}{3}\right)\div\left(-1\frac{1}{6}\right)$

Check your answers by referring to the Checkpoint 3 materials located at the back of your book.

If you needed help solving these problems correctly, then you need more practice. Review the Checkpoint 3 materials and try the practice problems. Also consider getting help outside of class time. From this point on, you will be expected to do problems like these quickly and easily.

3-111. Copy and complete these generic rectangles on your paper. Then write the area of each rectangle as a product of the length and width and as a sum of the parts.

a.

6		
	$13x$	-21

b.

x		
-5		
	x	$+3$

c.

$16x^2$	$-24x$	4

d.

$3x$		
-2		
	x	$+4$

3-112. Simplify using only positive exponents.

a. $(3x^2y)(5x)$

b. $(x^2y^3)(x^{-2}y^{-2})$

c. $\frac{x^3}{x^{-2}}$

d. $(2x^{-1})^3$

Chapter 3 Closure What have I learned?

Reflection and Synthesis

The activities below offer you a chance to reflect about what you have learned during this chapter. As you work, look for concepts that you feel very comfortable with, ideas that you would like to learn more about, and topics you need more help with. Look for connections between ideas as well as connections with material you learned previously.

① TEAM BRAINSTORM

What have you studied in this chapter? What ideas were important in what you learned? With your team, brainstorm a list. Be as detailed as you can. To help get you started, a list of Learning Log entries and Math Notes boxes are below.

What topics, ideas, and words that you learned *before* this chapter are connected to the new ideas in this chapter? Again, be as detailed as you can.

Now consider the Standards for Mathematical Practice. Obtain the Chapter 3 Closure Resource Page: Standards for Mathematical Practice from your teacher. What Mathematical Practices did you use in this chapter? When did you use them? Give specific examples.

How long can you make your list? Challenge yourselves. Be prepared to share your team's ideas with the class.

Learning Log Entries

- Lesson 3.1.2 – Zero and Negative Exponents
- Lesson 3.2.2 – Area as a Product and as a Sum
- Lesson 3.3.3 – Summary of Solving Equations

Math Notes

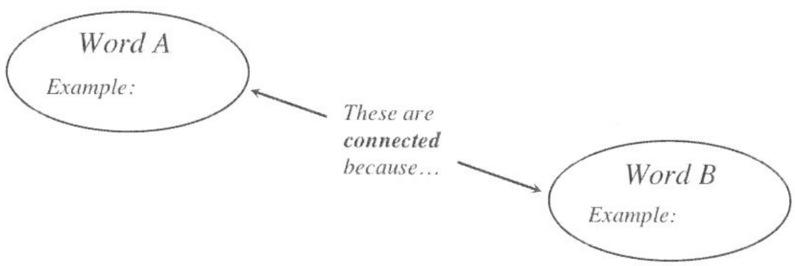
- Lesson 3.1.2 – Laws of Exponents
- Lesson 3.2.1 – Using Algebra Tiles to Solve Equations
- Lesson 3.2.2 – Multiplying Algebraic Expressions with Tiles
- Lesson 3.2.3 – Vocabulary for Expressions
- Lesson 3.2.4 – Properties of Real Numbers
- Lesson 3.3.1 – The Distributive Property
- Lesson 3.3.2 – Linear Equations From Slope an/or Points
- Lesson 3.3.3 – Using Generic Rectangles to Multiply

② MAKING CONNECTIONS

Below is a list of the vocabulary used in this chapter. Make sure that you are familiar with all of these words and know what they mean. Refer to the glossary or index for any words that you do not yet understand.

area	terms	Distributive Property
polynomial	expression	"legal" moves
generic rectangles	integer	dimensions
equation	product	algebra tiles
closed sets	sum	solution
solve	standard form	evaluate
binomial	length · width	base
exponent		

Make a concept map showing all of the connections you can find among the key words and ideas listed above. To show a connection between two words, draw a line between them and explain the connection, as shown in the model below. A word can be connected to any other word as long as you can justify the connection. For each key word or idea, provide an example or sketch that shows the idea.



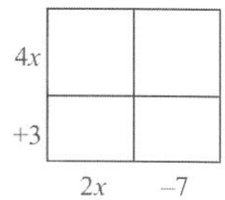
Your teacher may provide you with vocabulary cards to help you get started. If you use the cards to plan your concept map, be sure either to re-draw your concept map on your paper or to glue the vocabulary cards to a poster with all of the connections explained for others to see and understand.

While you are making your map, your team may think of related words or ideas that are not listed here. Be sure to include these ideas on your concept map.

③ PORTFOLIO: EVIDENCE OF MATHEMATICAL PROFICIENCY

Solve the equations in problem 3-105. If you have already solved them, review your work and revise it as needed. Record your work neatly and justify each step as evidence of the mathematics you are now able to do. Carefully show how you check your solutions.

Then show how you applied your understanding of area to use an area model to multiply expressions. For example, the area of the rectangle at right represents the product $(4x+3)(2x-7)$. Copy and complete the generic rectangle and write its area as a sum.



Next, use an area model to help your team members understand why $(x+y)^2 = x^2 + 2xy + y^2$. She thinks that $(x+y)^2 = x^2 + y^2$. Justify why $(x+y)^2 = x^2 + 2xy + y^2$ so that she is convinced that your answer is correct.

Extend this idea: What if one of the expressions being multiplied has three terms? How can a generic rectangle be used to multiply two expressions such as $(x^2 - 3)(3y + 2x + 1)$?

Now consider the Standards for Mathematical Practice that follow. What Mathematical Practices did you use in this chapter? When did you use them? Give specific examples.

BECOMING MATHEMATICALLY PROFICIENT

The Common Core State Standards For Mathematical Practice

This book focuses on helping you use some very specific Mathematical Practices. The Mathematical Practices describe ways in which mathematically proficient students should increasingly engage with mathematics throughout the year.

Make sense of problems and persevere in solving them:

Making sense of problems and persevering in solving them means that you can solve realistic problems that are full of different kinds of mathematics. These types of problems are not routine, simple, or typical. Instead, they combine lots of math ideas and real-life situations. You have to stick with challenging problems, trying different strategies and using all of the resources available to you.

Reason abstractly and quantitatively:

Throughout this course, you are first introduced to new math ideas by discovering them through real-life situations. Seeing math ideas within a context helps you make sense of things. Once you learn about a math idea in a practical way, you are able to think about the concept more generally, or "**reason abstractly**." At that point, you are often able to use numbers and math symbols to represent the math idea. This is called "**reasoning quantitatively**."

Construct viable arguments and critique the reasoning of others:

An important practice of mathematics is to **construct viable arguments and critique the reasoning of others**. In this course, you regularly share information, opinions, and expertise with your study team. You and your study teams use higher-order, critical-thinking skills any time you provide clarification, build on each other's ideas, analyze a problem and come to consensus, and productively criticize each other's ideas.

Model with mathematics:

When you **model with mathematics** you are taking a complex situation and using mathematics to represent it, often by making assumptions and approximations to simplify the situation. Modeling allows you to analyze and describe the situation and make predictions. For example, you model when you write an equation, or make graphs or tables or diagrams, to describe a situation. In situations involving the variability of data, you learn that although a model may not be perfect, it can still be very useful for describing data and making predictions. In the process of analyzing, you go back and improve your model by revising your assumptions and approximations.

Use appropriate tools strategically:

Throughout this course, you have to **use appropriate tools strategically**. Examples of tools include rulers, scissors, diagrams, graph paper, blocks, tiles, calculators, computer software, and websites. Sometimes, different teams decide to use different tools to solve the same problem. Frequently, the lesson concludes with a discussion about which tools are most efficient and productive to solve a given problem.

Attend to precision:

To **attend to precision** means that when solving problems, you need to pay close attention to the details. For example, you need to be aware of the units, or how many digits your answer requires, or how to choose a scale and label your graph. You may need to convert the units to be consistent. Other times, you need to go back and check whether a numerical solution makes sense in the context of the problem.

You need to **attend to the precision** when you communicate your ideas to others. Using the appropriate vocabulary and mathematical language can help to make your ideas and reasoning more understandable to others. This is an important academic and mathematical skill.

Look for and make use of structure:

Looking for and making use of structure is an important part of this course. By being involved in analyzing the structure and in the actual development of math concepts, you gain a deeper, more conceptual, understanding than just being told what the structure is and how to do problems. You often use this practice to bring closure to an investigation.

There are many concepts that you learn by looking at the underlying structure of a math idea and thinking about how it connects to other ideas you have already learned. For example, you use area models to understand the structure of multiplying binomials and connecting that structure to the Distributive Property. You understand the underlying structure of $y = mx + b$ by analyzing growth and starting point of linear functions.

Look for and express regularity in repeated reasoning:

Look for and express regularity in repeated reasoning means that when you are investigating a new mathematical concept, you notice if calculations are repeated in a pattern. Then you look for a way to generalize the method to other situations, or you look for shortcuts. For example, when working with negative or fractional exponents, you repeat exponent patterns that you already know to construct a method for simplifying these types of exponent problems.

④ WHAT HAVE I LEARNED?

Most of the problems in this section represent typical problems found in this chapter. They serve as a gauge for you. You can use them to determine which types of problems you can do well and which types of problems require further study and practice. Even if your teacher does not assign this section, it is a good idea to try these problems and find out for yourself what you know and what you still need to work on.

Solve each problem as completely as you can. The table at the end of the closure section has answers to these problems. It also tells you where you can find additional help and practice with problems like these.

CL 3-113. Two brothers, Martin and Horace, are in their backyard. Horace is taking down a brick wall on one side of the yard while Martin is building a brick wall on the other side. Martin lays 2 bricks every minute. Meanwhile, Horace takes down 3 bricks each minute from his wall. They both start working at the same time. It takes Horace 55 minutes to finish tearing down his wall.

a. How many bricks were originally in the wall that Horace started tearing down?

b. Represent this situation with equations, tables, and a graph.

c. When did the two walls have the same number of bricks?

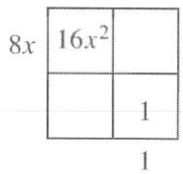
CL 3-114. Rewrite each of these products as a sum.

a. $6x(2x+y-5)$ b. $(2x^2-11)(x^2+4)$

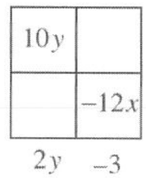
c. $(7x)(2xy)$ d. $(x-2)(3+y)$

CL 3-115. Find the missing areas and dimensions for each generic rectangle below. Then write each area as a sum and as a product.

a.



b.



CL 3-116. For each equation below, solve for x.

a. $(x-1)(x+7)=(x+1)(x-3)$

b. $2x-5(x+4)=-2(x+3)$

c. $|x+7|=11$

d. $|2x-3|=23$

CL 3-117. For each equation below, solve for y.

a. $6x-2y=4$

b. $6x+3y=4x-2y+8$

c. Find the slope and y-intercepts for the equations in parts (a) and (b).

CL 3-118. Simplify each expression.

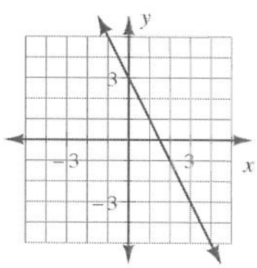
a. $(5x^3)^2$

b. $\frac{14a^3b^2}{21a^4b}$

c. $2m^3n^2 \cdot 3mn^4$

CL 3-119. Determine the equation of each line from the given representation.

a.



b. A line with a slope $-\frac{2}{3}$ and passes through the point $(-3, 4)$.

c.

x	−4	−3	−2	−1
y	−11	−9	−7	−5

CL 3-120. Evaluate the following expressions.

a. $-8\frac{2}{9}+7\frac{3}{5}$

b. $-4\frac{3}{8}-5\frac{3}{8}$

c. $10\frac{3}{4}\left(-8\frac{4}{9}\right)$

d. $-8\frac{3}{4}\div\left(-\frac{5}{7}\right)$

CL 3-121. Using your knowledge of exponents, rewrite each expression below so that there are no negative exponents or parentheses remaining.

a. $\frac{4x^{18}}{(2x^{22})^{0}}$

b. $(s^{4}tu^{2})(s^{7}t^{-1})$

c. $(3w^{-2})^{4}$

d. m^{-3}

CL 3-122. Check your answers using the table at the end of the closure section. Which problems do you feel confident about? Which problems were hard? Use the table to make a list of topics you need help on and a list of topics you need to practice more.

Answers and Support for Closure Activity #4
What Have I Learned?

Note: MN = Math Note, LL = Learning Log

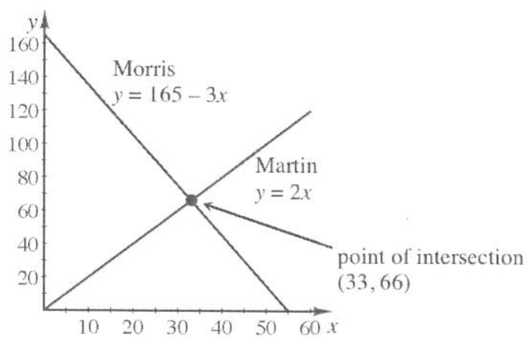
Problem	Solution	Need Help?	More Practice
CL 3-113.	a. $55(3) = 165$ bricks b. Martin's rule: $y = 2x$ Horace's rule: $y = 165 - 3x$	Sections 2.1 and 2.2	Problems CL 2-104, CL 2-105, CL 2-106, 3-52, 3-61, and 3-72

Martin's table:

Min.	Bricks
0	0
1	2
2	4
…	…
56	112
57	114

Horace's table:

Min.	Bricks
0	165
1	162
2	159
…	…
54	3
55	0



c. After 33 minutes, they will each have 66 bricks.

Problem	Solution	Need Help?	More Practice
CL 3-114.	a. $12x^2 + 6xy - 30x$ b. $2x^4 - 3x^2 - 44$ c. $14x^2y$ d. $3x + xy - 6 - 2y$	Lessons 3.2.3 and 3.2.4 MN: 3.2.3, 3.3.1, and 3.3.3	Problems 3-70, 3-81, 3-100, and 3-103

Problem	Solution	Need Help?	More Practice
CL 3-115.	a. $(2x+1)(1+8x)=16x^2+10x+1$ $\begin{array}{r\|c\|c\|} \cline{2-3} 2x & 2x & 16x^2 \\ \cline{2-3} 1 & 1 & 8x \\ \cline{2-3} \multicolumn{1}{r}{} & \multicolumn{1}{c}{1} & \multicolumn{1}{c}{8x} \end{array}$ b. $(2y-3)(4x+5)=$ $8xy-12x+10y-15$ $\begin{array}{r\|c\|c\|} \cline{2-3} 4x & 8xy & -12x \\ \cline{2-3} 5 & 10y & -15 \\ \cline{2-3} \multicolumn{1}{r}{} & \multicolumn{1}{c}{2y} & \multicolumn{1}{c}{-3} \end{array}$	Lessons 3.2.4	Problems 3-83, 3-101, and 3-111
CL 3-116.	a. $x=\frac{1}{2}$ b. $x=-14$ c. $x=4, -18$ d. $x=13, -10$	Lesson 3.3.1	Problems 3-84, 3-93, 3-102 and 3-107
CL 3-117.	a. $y=3x-2$ b. $y=-\frac{2}{5}x+\frac{8}{5}$ c. Part (a): $m=3, b=-2$ Part (b): $m=-\frac{2}{5}, b=\frac{8}{5}$	Lesson 3.3.2	Problems 3-94 and 3-104
CL 3-118.	a. $25x^6$ b. $\frac{2b}{3a}$ c. $6m^4n^6$	Lesson 3.1.1	Problems 3-6, 3-12, 3-19, 3-75(b), and 3-98
CL 3-119.	a. $y=-2x+3$ b. $y=-\frac{2}{3}x+2$ c. $y=2x-3$	Sections 2.1 and 2.2 MN: 2.1.4 and 2.2.2 LL: 2.1.3, 2.1.4, 2.3.1, and 2.3.2	Problems 2-73, 2-100, CL 2-101, 3-22, 3-24, 3-38, 3-51, 3-62, and 3-108
CL 3-120.	a. $-\frac{28}{45}$ b. $-9\frac{3}{4}$ c. $-90\frac{7}{9}$ d. $12\frac{1}{4}$	Checkpoint 3	Problems 3-11, 3-37, 3-63, 3-95, and 3-110
CL 3-121.	a. $4x^{18}$ b. $s^{11}u^2$ c. $\frac{81}{w^8}$ d. $\frac{1}{m^3}$	Section 3.1	Problems 3-20, 3-75 (a) and (c), and 3-112